

Conservation Subdivision: Design Phase—Wetland Considerations¹

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Introduction

As urban communities grow, design and management strategies for new developments become critical factors that determine impacts on natural resources. How can we accommodate growth and yet conserve natural resources, such as biodiversity, water, and energy? In this document, we focus on conserving biodiversity when land is subdivided. The term biological diversity or *biodiversity* refers to the variety of life and its processes. Biodiversity includes species diversity, habitat diversity, and genetic diversity. For the purposes of this article, we focus on biodiversity of *native* species. Native species are plants and animals that were present within a specific region before Europeans made first contact. Non-native (or exotic) plants or animals are defined as those species that were not present in the region before European contact.

Recently, a popular concept called *clustered development* or *conservation subdivision* has been advanced by the landscape architecture community. Conservation subdivision is intended to integrate growth with biodiversity conservation. Conservation subdivisions typically are developments where homes are clustered on small lots with the remaining areas conserved as open space.

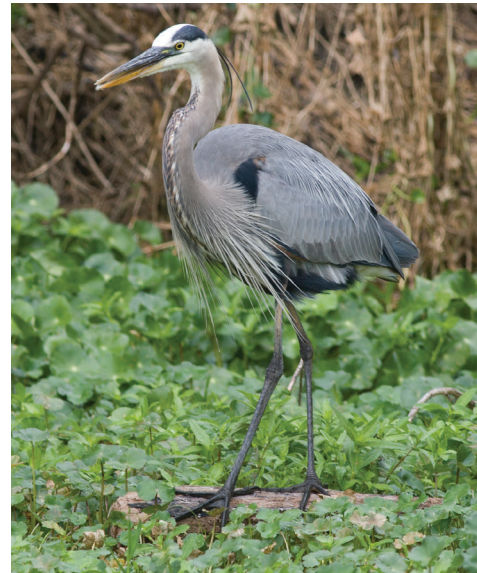


Figure 1. A Blue Heron foraging near the Alachua sink at Payne's Prairie, just outside of Gainesville, Florida.

Credits: Tyler Jones, UF/IFAS

The concept of conservation subdivision has gained traction in many planning and design fields. The goals for conservation subdivisions are twofold: 1) to improve biodiversity within a designated subdivision; and 2) to minimize development-related impacts on surrounding habitats. Often, though, most of the effort is on the design of the entire site. To conserve and improve biodiversity within urban environments effectively, one must consider the following three phases of development: design,

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construction, and post-construction. Overall, these three phases must be addressed in order to create and maintain biodiversity within residential subdivisions. The “Conservation Subdivision” series of EDIS documents discusses biodiversity conservation pertaining to all three phases of development. This fact sheet focuses on decisions made in the design phase.

The design phase is typically where, among other aspects, lot size and open space area is designated and roads are distributed throughout the site. Goals for the development project are discussed and prioritized. In this phase, homes and lots are placed across the site and the remaining area is designated as natural open space. Basically, everything is laid out on paper and vertical structures (buildings) and horizontal structures (roads, lots, conserved areas, and shared spaces) are given specific spaces within the development.

Next, during the construction phase, a whole host of built environment professionals (e.g., architects, contractors, and subcontractors) take whatever is on paper and implement it on the ground, constructing homes, streets, waste treatment systems, and landscaped areas such as lots and parks. In the absence of fully trained or engaged contractors or landscapers, many things can happen during this phase that could decrease the viability of onsite and nearby natural habitat. For example, even if the most important large trees are preserved across the subdivision and built areas are designed around them, the placement of topsoil and routes used by heavy construction vehicles could impair the survival of these trees. If heavy construction vehicles continually run over the root zones of trees or if topsoil is placed against their trunks, the roots may not be able to acquire nutrients, water, and oxygen and the trees may die.

In the final phase, post-construction, buyers purchase the homes, move into the community, and manage their own homes and sections, neighborhoods, and common areas. It is now the responsibility of residents to manage their homes, yards, and neighborhoods in ways that do not compromise the original intent of the community. Additional problems can arise if residents are not fully engaged—imagine residents moving in and planting invasive exotic plants in each of their yards. Residents could also improperly apply fertilizers and pesticides. The spread of invasive plants and stormwater runoff could then destroy or at least severely reduce the diversity of animals and plants found in the conserved areas.

Again, all three phases, design, construction, and post-construction, must be addressed in order to create and maintain biodiversity within residential subdivisions. The overall effort begins with the design phase. During the design phase, people will often consider wetland protection because of local rules and regulations. While Florida has lost the majority of its wetlands, current regulations attempt to protect those that remain. This fact sheet discusses issues surrounding on-site protection of wetlands and strategies to create wetlands that conserve biodiversity.

Wetland Considerations

The vast majority of wetlands in Florida have been drained or irretrievably modified for development, farmland, flood control, and the creation of Florida’s vast transportation network. The rainwater, which would normally pool and seep slowly into the ground, is now swiftly carried to rivers, streams, estuaries, and lakes due to stormwater runoff from impervious surfaces (e.g., buildings and roads). It is estimated that 220 million acres of wetlands existed in the lower 48 states. Now less than 50% remain. Twenty-two states, including Florida, have lost at least 50 percent of their original wetlands (see <http://www.epa.gov/owow/wetlands/pdf/threats.pdf>). In many regions, cattle now graze where water birds once waded; and weeds, eutrophication and pollution have reduced the biodiversity of many surviving wetlands.

Wetland protection is primarily the province of the Environmental Protection Agency and state/local regulatory agencies. At the state level, the Department of Environmental Protection (DEP) is the primary regulatory authority that oversees wetland protection. The water management districts (WMD) also are involved with wetland protection, enforcing the provisions of Chapter 373, Florida Statutes, also known as the Florida Water Resources Act of 1972. In addition, local city/county regulations may apply to specific areas.

The delineation of a wetland is based on several metrics, usually including the presence of hydric (wet) soils and the dominance of vegetative species suited to continued or periodic inundated or saturated soils. The long-term health of wetlands in and near subdivisions is contingent on the placement of built infrastructure. The layout and installation of roads and buildings throughout a development will have a substantial impact on the health of conserved or restored wetlands. The best way to conserve wetlands on a parcel of land is to determine where significant wetlands are located and place built infrastructure as far away as

possible. This includes considerations for wetlands that border the planned development.

Conserving a buffer around a wetland helps to preserve its long-term health. Typically, moderately drained land (i.e., buffers near wetlands) generally does not share the same protection status as wetlands or water bodies. Regulations vary from county to county, and developers typically prize shorelines. The real estate value of such land has contributed to a rapid decline in undisturbed shorelines and buffers around wetlands. Wetland buffers are important because they help minimize impacts from surrounding land use (e.g., stormwater runoff coming from impervious surfaces). When developments occur near wetlands and waterways, it is essential to create vegetative buffers that separate built areas from conserved wetlands.

Overall, the health and biodiversity of a development's wetlands are highly dependent on the health of the upland habitats surrounding them. Buffers provide many benefits to wetlands and natural water bodies. They help to minimize erosion and sediments from entering the water. Buffers also help control extreme fluctuations in water temperatures and they contribute woody debris, which becomes important fish and aquatic insect habitat. Buffers also help to filter out pollution and excess nutrients from groundwater. Stormwater runoff from built areas can harm wetlands because excessive nutrients and silt can choke these systems. Clean water with minimal silt and pollutants benefits many aquatic organisms, including insects, fish, and birds. From a wildlife perspective, buffers supply food and cover for many species that require wet and dry habitats.

Whenever possible, wetlands should be surrounded with broad buffers. Buffers need not be the same fixed width around the entire wetland. The minimum upland buffer required to ensure healthy wetlands varies greatly between each specific natural community and according to local and regional government recommendations. Consult local government policies and wetlands specialists to provide the optimum buffer for your valuable wetland amenities.

Biodiversity vs. Water

One unique challenge is conserving wetlands while creating a compact development that adheres to ecological principles of creating large, unfragmented natural areas (see UW320 [Conservation Subdivision: Design Phase—Patch Size and Shape of Conserved Open Spaces](#)). Often local policies will require the protection of any wetland or even small depressions, and the developer must build around

them. This can result in a “shredded” site plan with wetlands interspersed among built areas. From basic ecological principles, a fragmented landscape is not conducive to conserving some of the more sensitive plant and animal species. Incorporating many small natural areas into a design means routing automobile traffic around these areas, and this means more roads, more impervious surfaces, and greater stormwater runoff. Further, small, fragmented wetlands and conserved upland areas surrounded by built landscapes receive more stormwater runoff and other problems stemming from their proximity to the new homes and streets than do larger, more separate conserved areas.

Grouping wetlands and separating them as much as possible from built areas will make management of the conserved wetlands easier and will minimize harm from built areas. A compact design often means that some wetlands will need to be filled in and current policies usually have stiff prices when wetlands are destroyed. A compromise would be to use the more degraded wetland areas for stormwater mitigation: (e.g., enhanced retention ponds with native landscaping). Using native plants and pond designs that maximize wildlife habitat (e.g., littoral shelf zones for wading birds) can increase biodiversity values of these degraded wetlands.

Additional Resources

For additional information on conservation subdivisions and conserving urban biodiversity, a variety of online guides, books and other publications exist.

Books and Scientific Publications

Arendt, R.G., 1996. *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks*. Island Press, Washington, DC.

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Department of Wildlife Ecology and Conservation Extension <http://www.wec.ufl.edu/extension/>

Florida Fish and Wildlife Conservation Commission—Planting a Refuge for Wildlife <https://myfwc.com/viewing/habitat/refuge/>

Living Green <http://www.livinggreen.ifas.ufl.edu>

Program for Resource Efficient Communities <http://www.buildgreen.ufl.edu>

Sustainable Site Initiative <http://www.sustainablesites.org/>

Florida Wetland Restoration Center <http://www.dep.state.fl.us/water/wetlands/fwric>

Overview of Florida Wetland Regulations <http://www.dep.state.fl.us/water/wetlands/docs/erp/overview.pdf>

Handbook of Florida Water Regulation: Florida Department of Environmental Protection <http://edis.ifas.ufl.edu/fe593>